The IACHEC High-Resolution Working Group's view of the X-ray emission-line spectrum of Capella

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IACHEC High-Resolution WG objectives

- Instrumental wavelength reference frame (*cf* effective area)
  - dynamics of plasmas
    - 1mÅ at 12Å ⇔ 25 km/s
  - atomic physics
    - observed λ for databases
      - ATOMDB v2
      - CHIANTI
      - NIST
    - laboratory astrophysics
      - LLNL EBIT
    - theoretical calculations
      - HULLAC and other codes
        - $\Delta\lambda < 35$ mÅ
- Methods
  - DH's combined Chandra HETG spectra and RMFs of Capella
  - Compare phenomenological & physical models
    - Tabulation of lines ion-by-ion
    - `vapec`, `vmekal` & δ–functions

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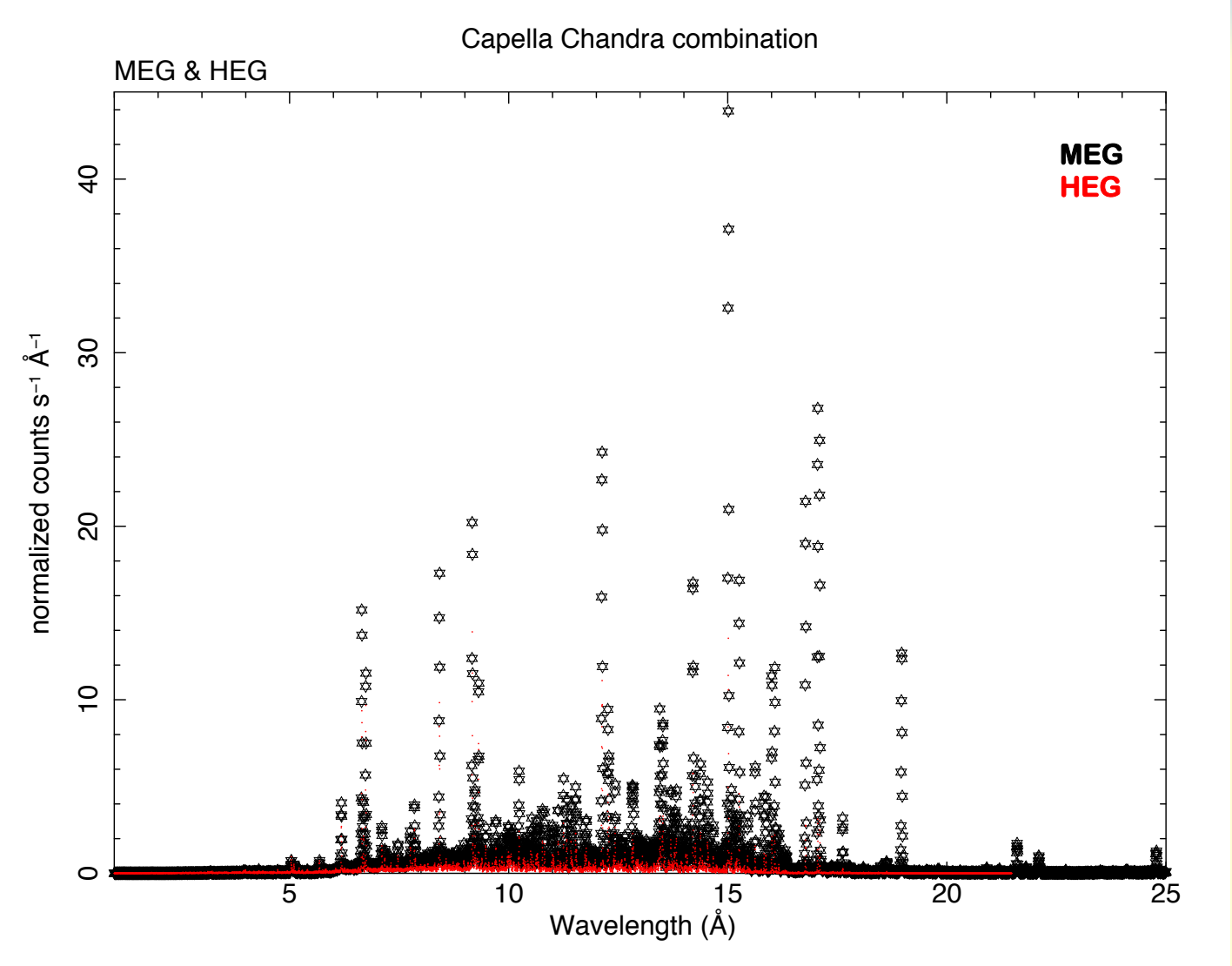
HETG spectra of Capella



X-ray spectrum of Capella

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Ions in 2010 Capella HETG models

	H-like	He-like	Li-like	Be-like	B-like	C-like	N-like	O-like	F-like	Ne-like
N	VII	VI								
O	VIII	VII								
F	IX	VIII								
Ne	X	IX								
Na	XI	X								
Mg	XII	XI								
Al	XIII	XII								
Si	XIV	XIII								
P	XV	XIV								
S	XVI	XV								
Cl										
Ar	XVIII	XVII	XVI	XV						
K										
Ca			XVIII	XVII	XVI	XV	XIV			
Sc										
Ti										
V										
Cr										
Mn										
Fe			XXIV	XXIII	XXII	XXI	XX	XIX	XVIII	XVII
Co										
Ni									XX	XIX
Cu										
Zn										

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HETG spectra and physical models of Capella

XSPEC v12.4.0	vapec	vmekal
TBabs	$n_H = 1.8\times10^{18}$ cm^{-2}	
kT (keV)	0.59681 ± 0.00040	0.59355 ± 0.00042
norm	9.8339 ± 0.0044	9.2075 ± 0.0046
He	1.	1.
C	1.	1.
N	0.7384 ± 0.0253	0.6050 ± 0.0278
O	0.2592 ± 0.0030	0.3278 ± 0.0042
Ne	0.2659 ± 0.0024	0.2218 ± 0.0027
Na		0.2886 ± 0.0290
Mg	0.3514 ± 0.0025	0.4172 ± 0.0031
Al	0.3272 ± 0.0113	0.3025 ± 0.0113
Si	0.3846 ± 0.0032	0.4313 ± 0.0037
S	0.3105 ± 0.0100	0.2591 ± 0.0085
Ar	0.2258 ± 0.0237	0.3188 ± 0.0332
Ca	0.4192 ± 0.0246	0.0000 ± 0.0536
Fe	0.2978 ± 0.0016	0.2948 ± 0.0018
Ni	0.4280 ± 0.0056	0.3327 ± 0.0051
C-statistic	117120.2	419264.5
NPHA	16384	16384
NDOF	16371	16370

δ

111705.9
16384
11121

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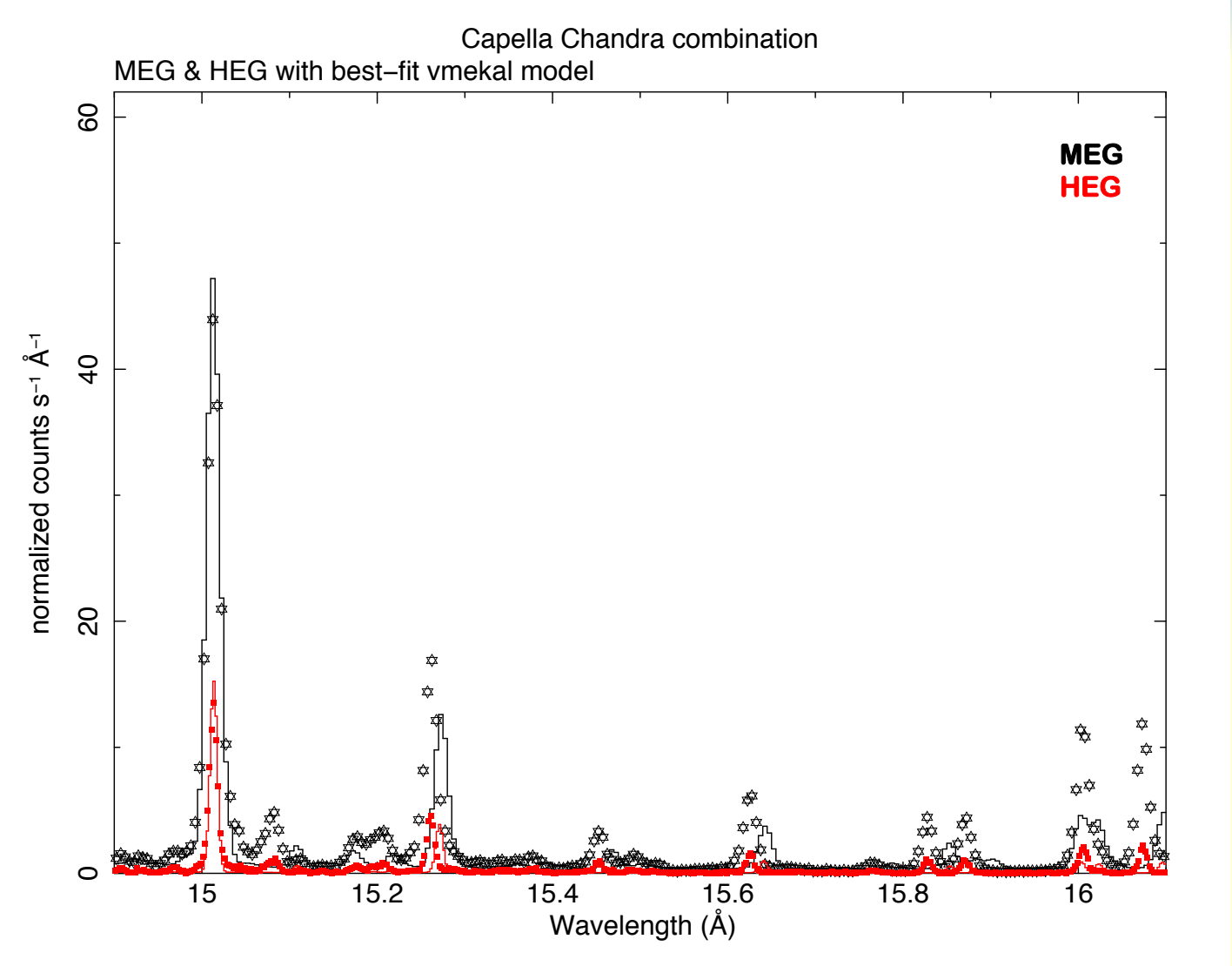
HETG spectra and models of Capella



X-ray spectrum of Capella

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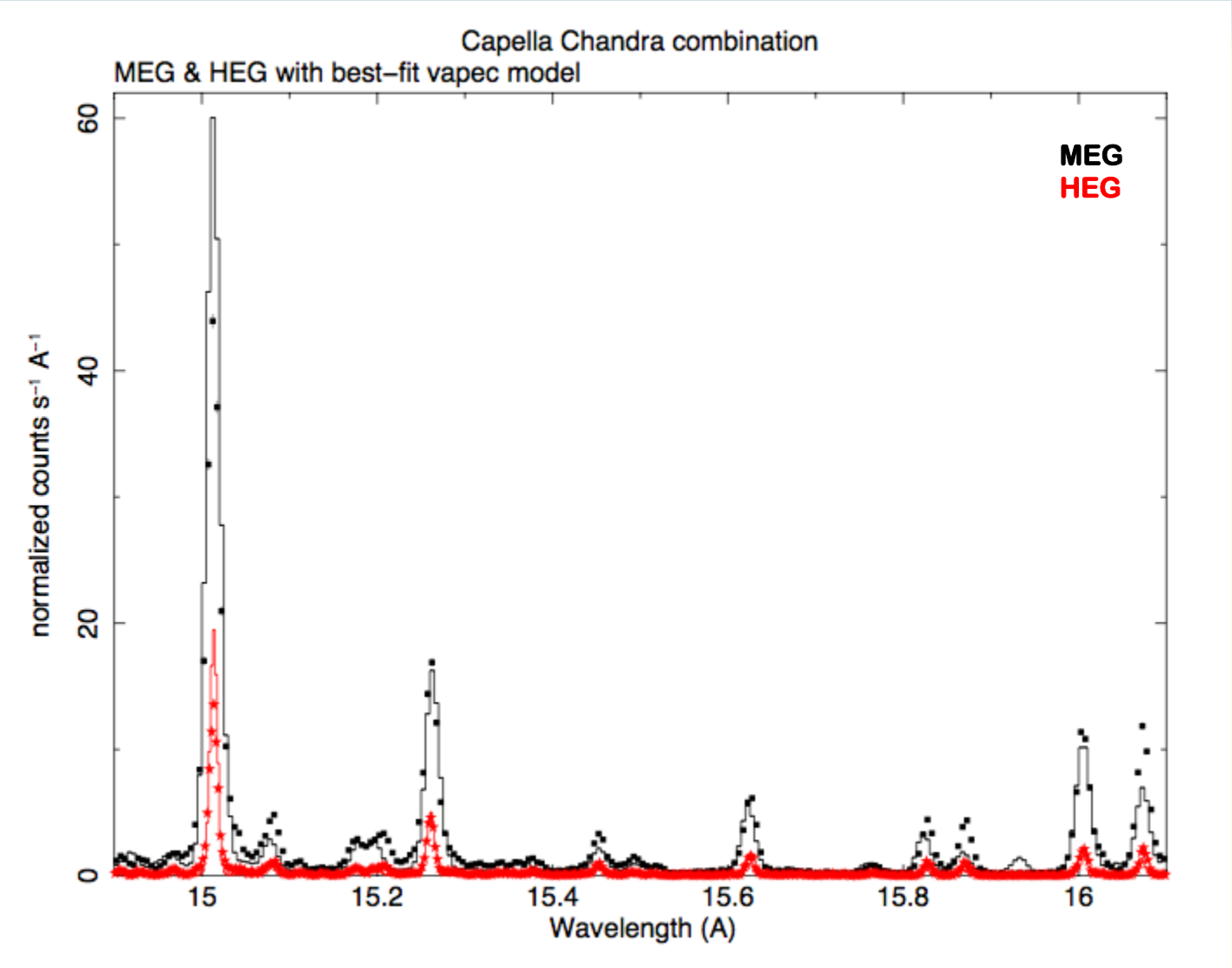

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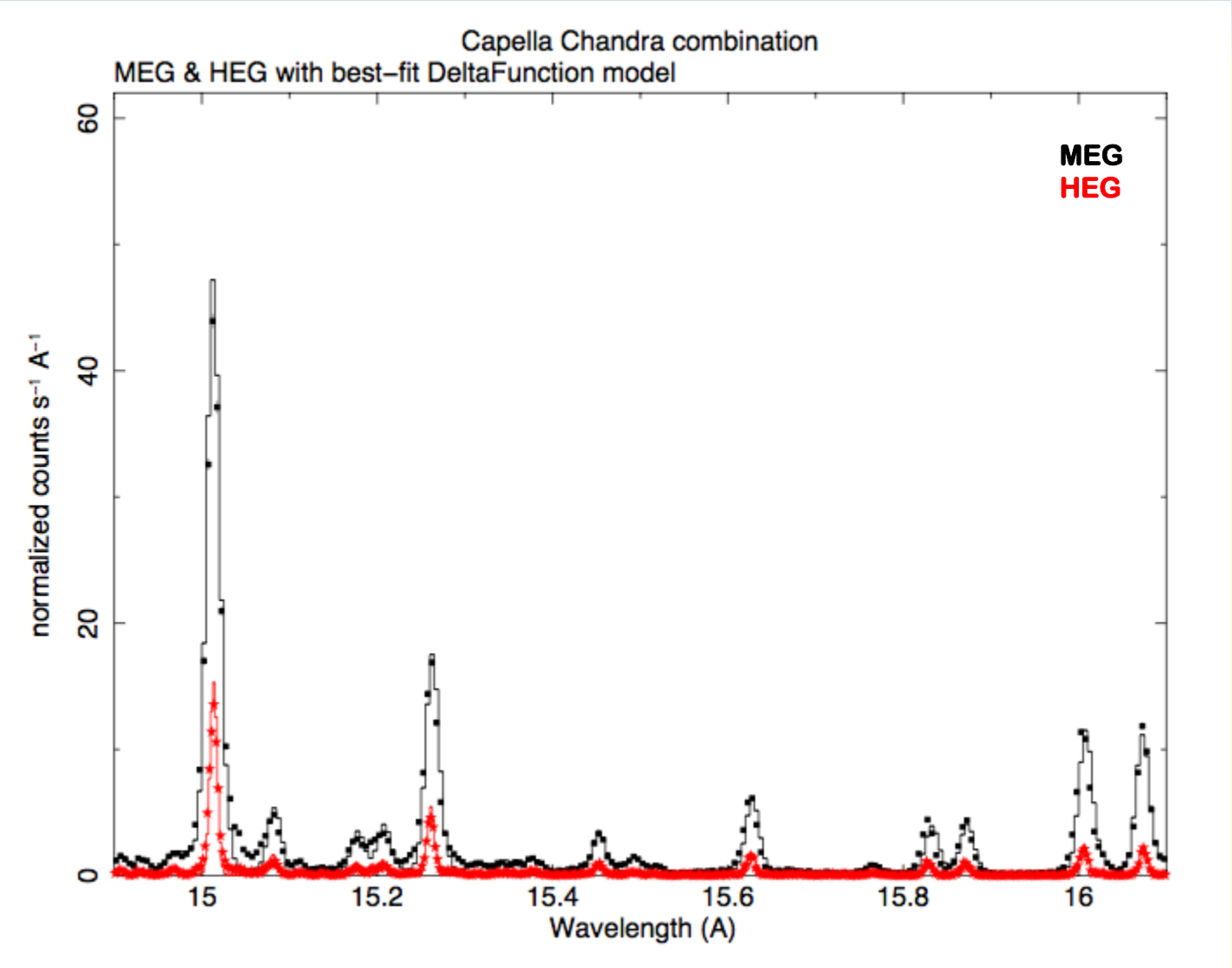

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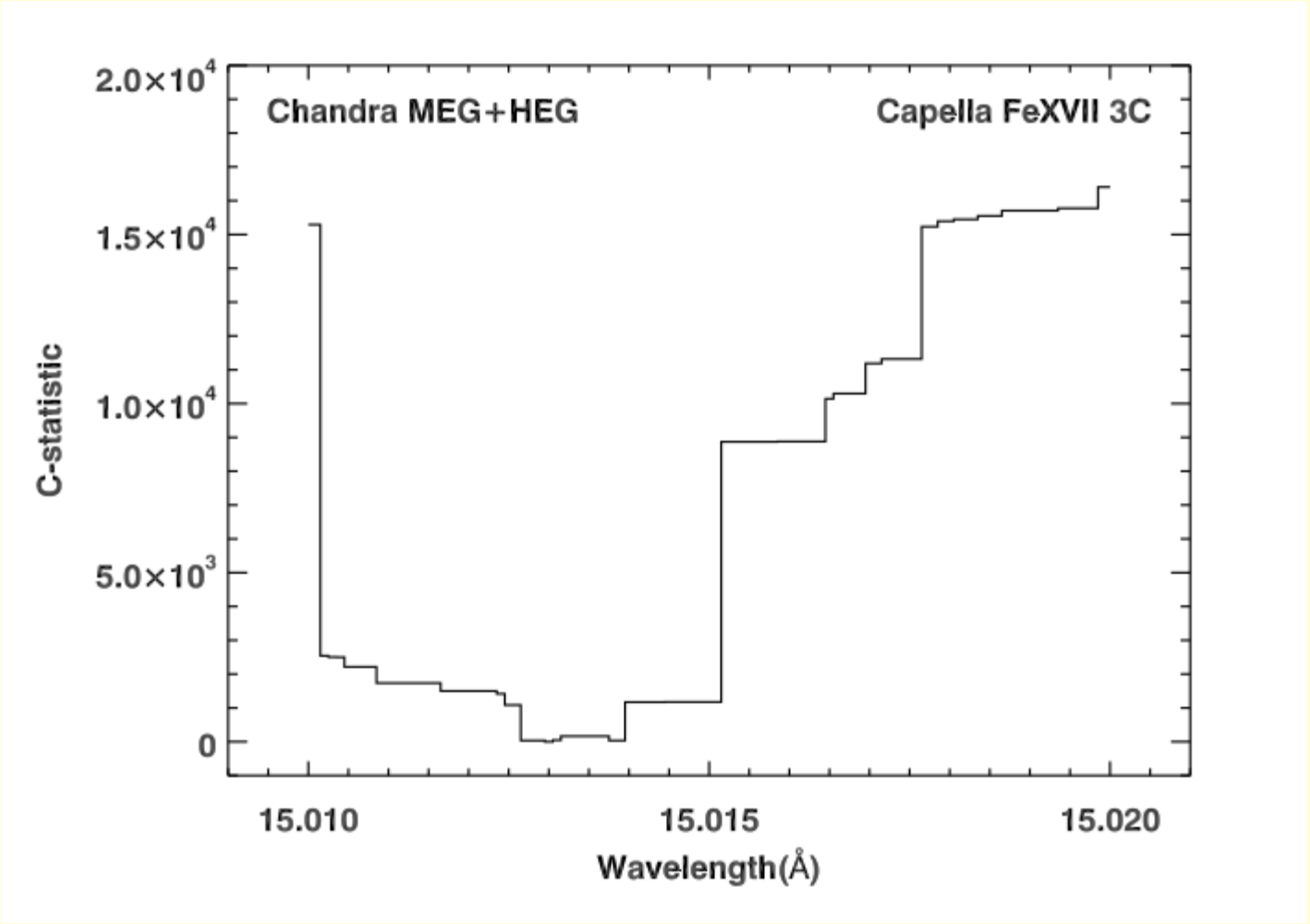
HETG δ-function models of Capella



X-ray spectrum of Capella

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Issues for the IACHEC WG this week

- Capella recruitment
  - HETG analysis review
    - high-resolution RMFs
    - 25×1Å interval `vapec` line-prospecting charts available
    - continuum questions
      - too high in `vapec`
      - APED NoLine with δ-function models
    - dielectronic recombination
  - publication plan
    - RGS
    - LETG
- General questions
    - Requirements for “VO” emission-line servers
    - Support for Laboratory Astrophysics
      - Request new measurements ?
    - `XSPEC vmekal`
    - Other targets

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High-Resolution Working Group 2010 report

- HETG, RGS & LETG X-ray wavelength benchmarks
  - > 10 recruits
  - Twiki
    - post Capella HETG combinations
  - Establish common reporting procedure
    - `vapec` model
    - δ-function model
    - Use of PROFIT code
    - ATOMDB 2.0.0 β
      - [C-Zn]
  - Assign 1Å intervals and elements to recruits
  - ISIS λ measurements
  - Publication ready for IACHEC 2011
- EBIT wish list
  - L-shell measurements of [Ca Si Cr]
  - FeXVIII 17.6 ≤ λ(Å) ≤ 18.6
- **¡¡ current `XSPEC mekal` does not contain Phillips+ 1999 benchmarks !!**
  - switch=0 allows a more sensible comparison

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